

SUPPLEMENT.

The Mining Journal, RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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ACCIDENTS IN COAL MINES—No. I.

[COMMUNICATED.]

Government Inspection of Coal Mines has become one of the institutions of the country, concerning which, notwithstanding great difference of opinion, undoubtedly exists respecting it, we cannot perhaps find one person who advocates its termination, or express a desire that it should not become a permanent institution. Its proper object and aim is the prevention of accidents, but more particularly of fatal accidents, and, so far as object and intention is concerned, it may be considered as a means instituted to prevent accidents. Hitherto it may properly be termed inspection or investigation after the occurrence of fatal accidents. In this capacity it has, no doubt, operated in inducing a certain amount of increased precaution, and thus indirectly it has, at least, prevented the increase of, if it has failed materially to decrease, the number of accidents; and, on the whole, the practice of mining has, at least in some cases, been improved through its agency.

Interests of the employer and employee are so identified in the prevention of fatal and other accidents that, *a priori*, we would have expected that grounds could not have existed for such an institution. Whether or not, it is very generally considered that the very necessity of such an institution more or less implies an imputation on colliery management—in this respect, that it has either been incapable or negligent in the working of collieries in its varied departments has been stated, either not having understood their duties, or understanding them, from mistaken motives of economy, or other motives decidedly more debatable, have failed to perform them. This impression, if not originated, has been very much increased by the *post obit* reports of most inspectors. We find in almost every report of almost every Inspector nearest statements that the most simple, ordinary, and obvious precautions in many instances have been long and habitually neglected; but, unfortunately, this was unknown, or at least not officially published, until some fatality has occurred. Having reference to these reports, we must infer that the Inspectors do not, to the extent it is exceedingly probable that they should in order to prevent fatal accidents, inspect collieries so as to assist at the investigation of a coroner's inquest; and not till then, we have minute examinations into the past, and completely obliterated, state of the workings, able reports clearly and fully proving how the accident has occurred, and how simply, obviously, and certainly it might have been prevented: but for prevention—primary object of inspection—it is too late, too late for ever. How is it because their powers, time, or inclination is defective? If their powers, let them be increased to the utmost extent requisite for the better preservation of life, but not by any means to such an extent as to relieve proper persons—the owners and the officials of every grade—from their responsibility. If their districts are too extensive, so that it is impossible to have time to carry out that extent of inspection which seems so desirable, by all means let the number of Inspectors be increased, for in all belief, it is to be found the principal defects of the system. Want of attention is a point no person having a personal acquaintance of the mine will urge, or yet will a doubt be expressed of their ability and industry. So far as the prevention of accidents is concerned, the public interest has already arrived at the conclusion that it has been, and still is, indispensable necessary that the system should be enforced. Instead of merely preventing accidents, other excellent effects are produced by such a system. These are of no slight importance. The Government, the public, the large number of workmen engaged in this important branch of industry, the suffering destitute survivors in cases of accident, each and all have an indisputable right to have a reasonable security that in every case of fatal accident not only has there been no neglect, but that there has also been exercised due precaution, and that the lives of the workmen have not been placed in jeopardy by the employment of reckless, careless, or inefficient agency. Even agents themselves it must be a source of unspeakable satisfaction, in the occurrence of unavoidable, purely accidental fatal injury, to have the testimony of the Government official that they have conducted their entrusted to their charge in a prudent, cautious, judicious, and careful manner. For my own part, I should be glad indeed were it possible to have the Inspector's assent or dissent to the arrangements for the safety of the mine.

The owners of colliery property have an important interest in the proper management of this question, and that interest will certainly be advanced by no one so just and permanent principle. The item of expenditure, paid to persons suffering from accidents, is a very considerable one, which is to be added the loss of their workmen's services, and while they continue, of course, the occupants of dwelling-houses, and at their cost, this latter charge usually becoming in the more serious explosions there is serious destruction of property and pecuniary loss, amounting, in some cases, to thousands of pounds, in cases producing complete bankruptcy and ruin, this being exemplified in the case of Land Hill, Risca, and, as is now current, in that of the latter not from explosion. The colliery generally suffers a permanent injury in the subsequent difficulty of obtaining a sufficient supply of good workmen; and in all cases the expense which was required to prevent such calamities is subsequently to be incurred, thus the expenses to be incurred of both bad and good arrangements. The owners of collieries in all cases, almost without exception, are anxious to spare no needless expense, so as to prevent the recurrence of accidents, and it is a fact which I have the utmost confidence and trust to endorse. It is not from any desire to avoid the necessary expense of providing proper safety, nor yet from the want of an ardent desire that they will demur to the extension of the principle and practice of inspection, but to avoid undue and unnecessary interference with their arrangements. They justly demur to submit to the arbitrary action of any Inspector, how ever adequate he may be; but there can be no objection, where the colliery is skillfully and carefully managed, to a full inspection of their mines, nor to the result of that inspection being published in the Inspector's annual report. The point to be considered is, so far as it can be done, as a general principle, the extension of the general rules, which are at present applicable to all collieries, that where the natural strata are insufficient, that the artificial strata must be either stone, brick, or iron, but not in any case temporary or that the ventilating and lighting of the mine must be such as to

ensure safety; and that the Inspector should inspect and give a full and detailed report of such inspection at least once a year. Wherever collieries are possessed of proper arrangements, there can be no possible objection to such a proceeding; where they are not, it is an indispensable necessity. The owner in most cases is desirous to make most complete the arrangements for safety, and is usually fully supported by the person he appoints as his manager; but neither the owner nor agent can constantly ensure that every officer of every grade shall strictly and fully attend to his duties; and as a guarantee on behalf of both owner, agent, and the public, the public functionary—the Inspector of Mines—ought to step in and sanction or object to the mode of providing and effecting the general arrangements, provisions, and regulations requisite to render every colliery as safe as the nature of the work will admit. This more frequent and minute inspection and reporting on the part of the Inspector, independent of accident, cannot reasonably be objected to by the owner or agents, and would contribute, to an extent not hitherto effected, in improving and perfecting underground arrangements, and would result in lessening the number of fatal accidents, in giving greater security to mining investments, and in satisfying the public mind in the event of a serious catastrophe, attended with fatal results; for no mine agent would allow his colliery to continue in an unsatisfactory condition when he knew it would be published to the world at least annually, and would, of course, become evidence of the state of the mine at the date of inspection. Preventive inspection involves examination previous to the occurrence of fatal injury, at intervals not too distant. We find the fatal accidents are classified by the Inspectors as follows:—those arising from explosions of fire-damp, falls of coal or stone, shaft accidents, and sundries. The present arrangement of inspection districts has been in operation since 1855, and principally under the same Inspectors. In referring to them I will, therefore, in all cases, give the names of the Inspectors now having charge of the districts, instead of that of the districts.

Statement showing the number of deaths from each principal cause, as classified by the Inspectors, for five years ending 1860:—

Year.	Causes of death.				Total.	Quantity of coals raised annually.	Deaths for each 1,000,000 tons raised.
	Explosions.	Falls.	Shafts.	Sundries.			
1856.....	236	399	210	188	1033	71,787,552	14.38
1857.....	377	372	162	208	1119	74,611,941	14.99
1858.....	215	366	172	178	931	73,725,895	12.63
1859.....	95	399	191	219	904	78,278,957	11.55
1860.....	263	388	182	176	1019	82,062,702	12.40
Totals.....	1286	1924	917	968	5095	381,067,047	13.37
Average.....	257	385	183	194	1019	76,213,409	13.37

Had the accidents been gradually decreasing the later years ought to have been in all cases below the average, hence the reason I give the average. This statement shows the very slight improvement that has been effected for five years, the only portion of time during the present system of inspection that the returns can be fully depended on. The difference between the highest and the lowest is seen thus:—

Deaths per 1,000,000 tons raised.				
1857—highest year.....	14.99	14.99	14.99	14.99
1858.....	12.63	12.63	12.63	11.55
1859.....	11.55	11.55	11.55	11.55
1860.....	12.40	12.40	12.40	12.40
Years.....	1856.	1860.	1858.	1859.

The difference between each year and the average of the five is:—

Years.	Average.	Each year.	Above average.	Under average.
1856.....	13.37	14.38	1.01	—
1857.....	13.37	14.99	1.62	—
1858.....	13.37	12.63	—	0.74
1859.....	13.37	11.55	—	1.82
1860.....	13.37	12.40	—	0.97

The greatest difference between the highest number of deaths per million tons raised and the lowest is only 3.44, and the greatest difference between the mean and the lowest is 1.82 less, and the highest 1.62 more. In any case the difference is not very marked, and the year 1860 is a little above an average of the whole, which it ought not to have been were the deaths uniformly decreasing.

Taking the year 1856 to be represented by 100, the proportionate loss of life in each will be represented as follows:—

Years.	No. of deaths.	Years.	No. of deaths.
1856.....	1033=100	1859.....	904=87.51
1857.....	1119=108.32	1860.....	1108=107.26
1858.....	931=90.12		

This does not show any uniform decrease, nor does it show the proportion of deaths to the coals raised, but by taking the number of deaths to each 1,000,000 tons of coals raised it will be thus:—

Years.	No. of deaths per 1,000,000 tons.	Proportion.	Difference.
1856.....	14.38	100	—
1857.....	14.99	104.24	4.24
1858.....	12.63	87.83	—12.17
1859.....	11.55	80.32	—19.68
1860.....	12.40	86.31	—6.99
Mean.....	13.37	92.97	—7.03

Except in the year 1859, which was unusually low in deaths from explosion, this shows but a trifling decrease, which will perhaps be more apparent if we take the mean of the five years to represent 100, thus:—

Years.	Deaths per 1,000,000 tons.	Above.	Below.
Average.....	13.37 = 100 percent.	—	—
1856.....	14.38 = 107.55	7.55	—
1857.....	14.99 = 112.11	12.11	—
1858.....	12.63 = 94.46	—	5.54
1859.....	11.55 = 86.39	—	13.61
1860.....	12.40 = 92.72	—	7.28

This shows for the year 1858 a decrease of 5.54, and for 1859 a decrease of 13.61; but for 1860 an increase of 0.22 per cent. on the average of the whole. The decrease on the whole is so trifling that I think we may correctly affirm that during these five years of inspection little more has been effected than preventing an increased rate of deaths in proportion to the coals raised.

If we examine the number of deaths arising from each general cause, as classified by the Inspectors, we will see the proportion of each:—

Total deaths for 5 years.		
Explosions.....	1286	25.25 per cent.
Falls.....	1924	37.75 "
Shafts.....	917	18.00 "
Sundries.....	968	19.00 "
Total.....	5095	100.00 per cent.

For each year separately we have:—

	1856.		1857.		1858.		1859.		1860.	
	Deaths.	Per cent.	Deaths.	Per cent.	Deaths.	Per cent.	Deaths.	Per cent.	Deaths.	Per cent.
Explosions ..	236	22.84	377	33.69	215	23.09	95	10.50	263	25.76
Falls	399	38.63	372	33.24	366	39.31	399	44.14	388	38.02
Shafts	210	20.33	162	14.48	172	18.48	191	21.13	182	16.42
Sundries	188	18.20	208	18.59	178	19.12	219	24.23	176	15.80
Total	1033	100.00	1119	100.00	931	100.00	904	100.00	1108	100.00

We here see the proportion of deaths from each cause for each year, and may easily compare it with the proportion for the whole period. M. E.
[To be continued in next week's Mining Journal.]

NATIONAL ASSOCIATION FOR THE RELIEF OF BRITISH MINERS.

A public meeting in furtherance of the important and benevolent objects of this association was held on Thursday, March 27, at the Hanover-square Rooms,—Mr. SAMUEL GURNEY, M.P., President of the Council, in the chair. On the platform were Sir Fitzroy Kelly, Q.C., M.P., Mr. J. P. Hennessey, Mr. Henry Pease, M.P., Colonel Brownlow Knox, M.P., Mr. G. H. Whalley, M.P., G. J. Cockerell, Esq., J. Marshman, Esq., W. A. Thomas, Esq., E. T. Wakefield, Esq., W. M'Garel, Esq., &c.

The CHAIRMAN, in opening the proceedings of the meeting, said: As the President of the National Association for the Relief of British Miners I occupy the chair to-day, and it now becomes my duty to state a few facts about the object of this meeting. As I shall be followed by Sir Fitzroy Kelly, who has taken much interest in the welfare of this important class of our operatives, and has kindly consented to move the first resolution, I shall occupy but little of your time. It may be stated that something like 300,000 of our fellow-countrymen, having a million and a half dependent upon them, are engaged in mining operations, that 1000 are killed every year, and 10,000 every year injured. By the fearful catastrophe at Hartley 204 poor fellows were destroyed, and 400 persons left dependent upon charity. The public at once came nobly forward to the rescue; from one end of the country to the other subscriptions poured in, and 40,000, now remains over and above the amount that was said to have been required for their necessities; but another fearful calamity has occurred in South Wales, and whilst for Hartley more than double the amount needed has been subscribed, Gethyn is almost disregarded, and the bereaved there are still left in the deepest distress. (Hear, hear.) Now, these accidents clearly show the precarious nature of the miner's occupation, and the disparity between the subscriptions for Hartley and for Gethyn proves the absolute necessity for a well-regulated institution, such as that which I am now pleased to represent. (Applause.) I am glad to say the miners desire as far as possible to provide for themselves; they do not wish to be dependent upon our charity, they ask only our encouragement, and some assistance in the establishment of an institution which will secure to them well-regulated relief, education, and all that science can accomplish to mitigate the dangers to which they are exposed. (Hear, hear.) The objects of the association are, therefore, threefold:—1. Science, whereby accidents may be avoided. 2. Relief, to which the men themselves will contribute. 3. Education, whereby better overmen and better workmen will be secured. These facts, coupled with those to which I have briefly alluded, justify me in saying that here is a noble field for the most strenuous and persistent efforts of the philanthropist: 1000 men killed, 500 women and 2000 children deprived of their only means of support every year, and the calamities occasioned too often by causes over which others may have had, but over which they have no control. I hope by your liberal subscription this day you will give material, as you have by your countenance given moral, support to this great national undertaking. (Loud applause.) I will ask Sir Fitzroy Kelly to propose the first resolution.

Sir F. KELLY then came forward, and was loudly cheered. He said:—Mr. Chairman, ladies, and gentlemen, I have been requested to propose to this meeting the first of a series of resolutions, with a view to the formation of a Society for the Benefit of British Miners. Unconnected as I am with mines and mineral property, it, perhaps, may be expected that I should offer some apology for having taken thus early what appears a prominent part in endeavouring to establish a society of this character. I may say, to deal briefly with all that is of a preliminary nature, that a few gentlemen of philanthropic character, with highly benevolent objects, have for some months past dedicated their labours unceasingly to the collection of facts in relation to the moral, the physical, and the social condition of that immense class of our fellow-men, the British Miners, to which the attention of some individuals—and I rejoice to see amongst them, the first, my honourable and worthy friend, if he will permit me so to call him, who has done us the favour to take the chair (hear, hear)—has been called; and those gentlemen have likewise solicited to some extent the attention of the public to those considerations which have led to a desire on the part of those who now appear before you to establish a society for the objects which, briefly, indeed, but I hope intelligibly and satisfactorily, on the present occasion I shall have the honour to detail to you. It appears, from a cursory review of the condition and number of persons engaged in the mines of this country, that a state of things exists imperatively calling for the attention, for the sympathy, and for the support of the entire public, the whole community of this realm, in favour of a body of persons who have most especial claims to their consideration. (Hear, hear.) I might state that no less than 300,000 of our fellow-men, engaged in mineral operations in this country, contribute by their daily labour to the wealth, prosperity, power, and greatness of England (hear); and this enormous class of our fellow-men, our fellow-creatures, are, perhaps, with the single exception of seamen actually upon the sea, exposed to greater and more frequent dangerous casualties and calamities than any other class of people in the community. (Hear, hear.) I have told you of their numbers, and it is almost appalling to consider, that of those 300,000 persons, no less than 1000—that is 1000 human beings—perish in the course of their calling and occupation in every year of our lives. (Sensation.) But that number, again, is small compared with the number of those who sustain in a greater or less degree the mischief and the injuries to which their occupation exposes them—1000 per annum is the number of those who die—and die, I mean, from accidents and casualties incidental to their occupation—10,000 of them in every year that passes over us sustain greater or less mischief and injuries. (Hear, hear.) We have, therefore, 11,000 persons in every year out of 300,000, or, I may say, more than the thirtieth part of the whole number, who in every year sustain some sort of injury, sometimes fatal injuries, calling for the sympathy of all made acquainted with their misfortunes, and appealing—I hope not in vain—to the sympathy of the public at large. (Hear, hear.) It is not only direct accident, as I have stated, fatal accidents to 1000, and accidents more or less injurious to 10,000 more, but the constant, necessary, and, I may add, the deplorable results to the constitution and general health of those unhappy people to which attention ought to be especially directed. They breathe during almost all the working hours of their lives an atmosphere pestilential at all times, and occasionally poisonous; dangerous, therefore, to life; dangerous, therefore, to health—fatal sometimes to life; and this is the lot of all who are engaged in mining operations. (Hear, hear.) And what is the result? I will not detain you by quoting from a publication to which, perhaps, the attention of many of you has been directed—the late article in one of the principal reviews in this country, in which there is a most eloquent, but at the same time a most moving, description of the miner, as he appears to the eye of anyone who may travel or reside within the mining districts. Everyone who has been accustomed to compare the miner with his fellow-men can tell by the unnaturally heightened shoulders, the bent back, the pallid, solemn, unhealthy complexion that he is engaged in mining operations. There is, therefore, no miner, however fortunate he may be in escaping the mortal calamities to which I referred, or even from being numbered amongst the 10,000 who receive direct serious bodily injuries in the course of the year—there is no one who follows the occupation at all for any number of years in succession but suffers materially and permanently in his health, and, consequently, in his happiness and comfort. (Hear, hear.) But, besides, we find when we look to see the consequences of what I have now stated to the comparative duration, the average duration, of the life of the miner, as compared with the average duration of the life of other labourers in other occupations. We may take as a specimen the agricultural labourer.

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a further illustration of the inferiority of external to internal firing, and would point out that every one of the five explosions reported during the last month happened not to internally but to externally fired boilers, and an increasingly impressed with the fact that this district has done wisely in selecting the Cornish type of boiler in preference to the plain cylindrical egg-ended one, and that not only on the ground of efficiency and economy, upon which there can be no question, but also as regards safety."

FOREIGN MINING AND METALLURGY.

We return to M. Petitgand and his observations on the mineral treasures of the South of Spain. In connection with the group of Monténegro must be mentioned the coppers of Jéres, Finana, Oceana, and Nacimiento. These ores contain the elements of successful working, but commerce in copper minerals, which is regulated by England, has not been considered to present sufficiently remunerative aspects to enable the mines to assume at present a very great development, and they are besides, like all the rest of the country, difficult of access. It is the same with bearings of a similar nature on the Sierra Alhamilla and the Sierra d'Oris; but, notwithstanding this, the extraction effected has been at the annual rate of 600 to 700 tons of minerals, of an average standard of 12 to 16 per cent. The port of Almería is the natural outlet for these products. The Sierra Alhamilla comprises besides a great number of threads or veins of galena. At the southern extremity of the long chain of mountains to which M. Petitgand refers, and in those of its ramifications known as the Sierras de Mujicar and Cabrera, vast deposits of carbonated iron are met with. The most remarkable are the bearings of Carbonera, Ferreña, Fraile Massón, &c., which, in consequence of their proximity to the sea, are very actively worked, the produce being exported to England, and ironworks in the South of France. The plumbiferous veins mentioned in the other localities to which attention has been directed lose their value, however—at any rate relatively—as soon as the bearings of the Alpujarras are reached. This is the great metalliferous region of the district, of which it occupies the central part, parallel to the Sierra Nevada and the shores of the Mediterranean; and it comprises a series of abrupt mountainous chains, with deep ravines running from east to west. The whole are united by the plains of Rio-Andarax and the hills of Lujar and Ujjar, which mountains, known under the names of the Sierra de Gador, Contraviesa, and Lujar, cover all the space between Almería and Motril. Adra, with its great reduction works, is placed at an equal distance from these two towns, in the neighbourhood of the principal workings. The place has preserved the advantages of its position, notwithstanding the rivalries by which it has been assailed, since discoveries were made in the Sierra Almagrera, and more recently since equally important explorations were effected in the province of Carthagena. The surface of the Alpujarras is composed of an infinity of mountain chains with sterile slopes, intermingled in the most contrary directions, cut up with deep defiles, destitute of wood and water, and presenting no traces of roads. The Sierra de Gador is the most interesting and the most distinctively characterised of all this district, and in the mountainous ranges nearest the sea, stretching also to the parts most distant from it, immense workings are carried on, which for the last 40 years have given life and animation to a spot formerly a desert, and which have made, as by enchantment, rapid fortunes. Talcous, or micaceous schists of various tints, from grey to the colour of the lees of wine, constitute the base of the lands which have yielded such great results, and which are formed of argillaceous slaty schists, conglomerates, crystalline, and compact black calcareous matter, &c., in the midst of which are found deposited, in the nature of beds, the metallic masses, which are of varied structure and different richness. According to M. Amalio Maestre, who has given, if not the most exact, at any rate the most satisfactory description of these beds; they are so connected together that they seem to form a vast metallic map, except where later disruptions have destroyed the uniformity, and created several distinct stages, without apparent relation to each other. This hypothesis could only be verified by an examination of the whole of the workings, which is not possible with the rules now in force, but all the opinions expressed on the subject point to the same conclusion—the prodigious richness of the bearings.

The Sierra de Gador presents the form of a parallelogram, about 25 miles in length by 8 or 10 miles in breadth. The mineral beds occupy in the first line the western part of this surface, commencing at the plateau of Lujar and the banks of the Rio Andarax, which there takes its rise; and they are enclosed by the territories of Dalías and Berja, extending over a space of 25 square miles or more. The ground has been turned up at every step, covered with rubbish, and riddled with pits, for the purpose of developing the famous workings, among the most celebrated of which—out of a great number which either have been or are still carried on—may be mentioned the Loma del Sueno, the Loma del Vicario, the Pecho de Laseras, the Loma del Guijo, the Hoya de Barcos, the Morgana, the Hoya de Martos, the Hoya de los Hatos, the Solana del Fondon, the Canada de Gujarrales, &c. The eastern part of the Sierra, without having exhibited equally brilliant results, has also enjoyed considerable fame and reputation; it is represented by the Loma de la Fuente, the Hoya Pocio, the Llano del Plana, the Cerro Gordo, the Loma de la Capitana, the Loma de los Hatos, the Loma de Emmedio, the group of Berja, and a great number of other workings, which we have scarcely space to particularise. We have further details yet to give with respect to the lead, copper, &c., of this wondrous Sierra de Gador.

The threatened, but scarcely actual, hostilities with Mexico, have had the effect of directing increased attention to the mineral riches of that country, the resources of which have hitherto been, it is to be feared, but very imperfectly developed, although it is a district in which the precious metals are spread with more lavish profusion than in any other part of the globe. The mining localities which are the richest in gold are those of Guanajuato, Sonora, and Chinaloa; and silver abounds in Zacatecas and Guanajuato. St. Luis de Potosi, so rich at the commencement of this century, is now producing almost nothing. In the years comprised between 1800 and 1830, the value of the products of the gold mines of Mexico was estimated at 6,436,453l., and the yield of the silver mines in the same period was estimated at 139,820,000l. These totals do not comprise the shipments made by smugglers, which at the commencement of this century were estimated at 1-30th, and which are now set down at 1-15th of the total value. Iron, it appears, has not been worked in Mexico since 1820. Copper yields very abundant results, but the working of all these riches is still carried on very imperfectly, both capital and labour being wanting; and worse than all, that security for property having no existence without which all enterprise is stricken with languor and sterility. Spain is a country equally favoured with Mexico as regards the richness of its mineral products, but the same adverse influences have been at work among the Spaniards, and have to a great extent produced the same results; and it is only of late years that a revival of industry, led and encouraged by French and Belgians, has tended to completely transform the condition of a naturally very richly endowed country.

Within the last few days a new trial has been made, at the desire of several French mining engineers, of the perforator invented by M. Lisbet, for piercing mine borings in granitic rocks. It appears that the results obtained indicated a boring of nearly 1 in. in four minutes, and the experiment showed the necessity of certain small modifications of the apparatus, which have since been carried out. M. Jacquet, the constructor of the perforator, believes that he shall now be able to perforate similar rocks in less time, and also with less difficulty.

An imperial decree with respect to the free entry of certain categories of iron into France is expected to open a great future to several special Belgian establishments—among others, to those which fabricate fine thin plates, such as those of M. Delloye at Huy and Ougrée, who have attained such a high reputation, while at the same time they have maintained prices at a point at which competition can be carried on with difficulty. M. Delloye's ancestors were forge masters and manufacturers of plates at the commencement of this century.

A CONDENSED AIR LOCOMOTIVE.—A new kind of locomotive engine was tried with perfect success on the Nicotian line, St. Petersburg, on March 16. The motive power was condensed air, and the trial was made to ascertain the adaptability of the engine in working the line. The inventor is named Baranowski, and the machine consists of a framework, with a reservoir for condensed air, and a number of tubes running above and below it. The trial trip was made with a carriage filled with passengers, and gave a very satisfactory result as regards speed, for the carriage was drawn at about 24 English miles an hour, and the inventor asserted that a greater speed can be attained, as his engine was originally built for a screw steam-ship, and much power was lost by the intervention of cog-wheels, which would not be necessary in a properly constructed engine.

Among the articles sent from Spain to the Universal Exhibition is a mechanical hand, invented by an Andalusian artist, which enables the wearer to pick up the smallest objects, and even to write, merely by the impulse of the muscles and nerves of the arm. The efficiency of this invention has been proved by experience, in presence of the Minister of Public Works.

BASTIER'S PATENT CHAIN PUMP.

APPARATUS FOR RAISING WATER ECONOMICALLY, ESPECIALLY APPLICABLE TO ALL KINDS OF MINES, DRAINAGE, WELLS, MARINE, FIRE, &c.

J. U. BASTIER begs to call the attention of proprietors of mines, engineers, architects, farmers, and the public in general, to his new pump, the cheapest and most efficient ever introduced to public notice. The principle of this new pump is simple and effective, and its action is so arranged that accidental breakage is impossible. It occupies less space than any other kind of pump in use, does not interfere with the working of the shafts, and unless lightness with a degree of durability almost imperishable. By means of this hydraulic machine water can be raised economically from wells of any depth; it can be worked either by steam-engine or any other motive power, by quick or slow motion. The following statement presents some of the results obtained by this hydraulic machine, as daily demonstrated by use:—

- 1.—It utilises from 90 to 92 per cent. of the motive power.
- 2.—Its price and expense of installation is 75 per cent. less than the usual pumps employed for mining purposes.
- 3.—It occupies a very small space.
- 4.—It raises water from any depth with the same facility and economy.
- 5.—It raises with the water, and without the slightest injury to the apparatus sand, mud, wood, stone, and every object of a smaller diameter than its tube.
- 6.—It is easily removed, and requires no cleaning or attention.

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Passengers holding Victoria passage warrants will be forwarded to Melbourne by these vessels.

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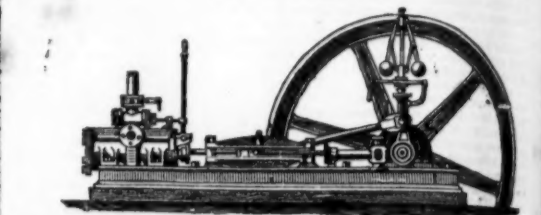
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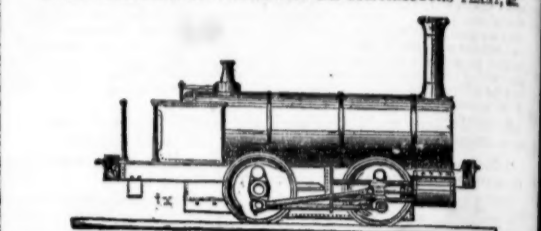
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